

Supplement

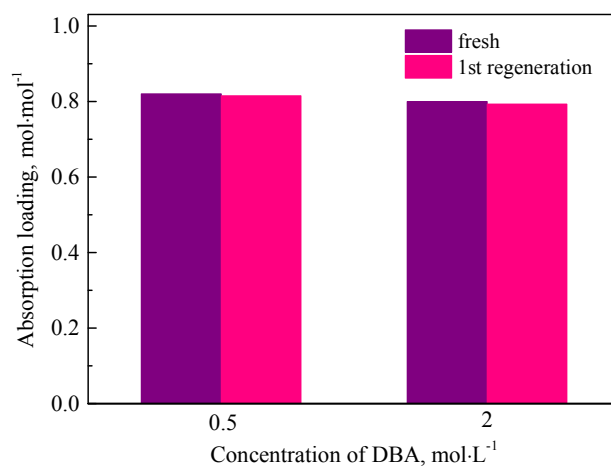


Figure S1 The absorption loading and regeneration efficiency of DBA/water/ethanol under different DBA concentration. ($V_{\text{water}}:V_{\text{ethanol}}=5:5$; Q_{CO_2} : $60 \text{ mL}\cdot\text{min}^{-1}$; V : 25 mL ; $T_{\text{absorption}}$: 313 K ; $T_{\text{desorption}}$: 373 K ; $t_{\text{desorption}}$: 60 min.)

CO_2 capture into DBA/water/ethanol under a low (0.5 M) and high concentration of amine (2 M) was investigated, and the results are shown in Figure S1. The results showed that the absorption loading and the regeneration efficiency of $2 \text{ mol}\cdot\text{L}^{-1}$ DBA/water/ethanol solution were 0.80 mol/mol and 99.1% , respectively which were consistent with that of $0.5 \text{ mol}\cdot\text{L}^{-1}$ DBA solution in the present work. It demonstrated that the change of DBA concentration exhibited negligible influence on the absorption loading and the regeneration efficiency.

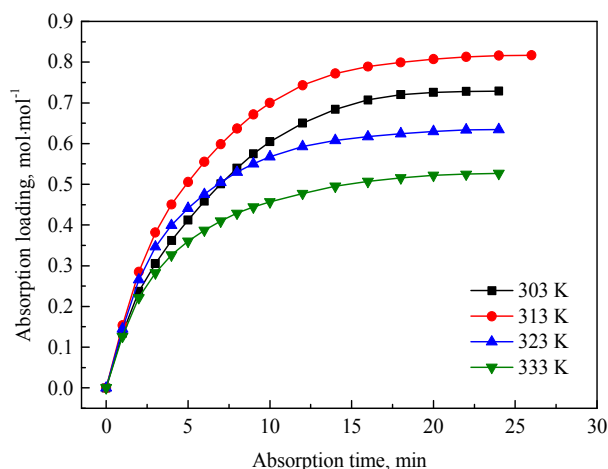


Figure S2 The absorption loading of DBA/water/ethanol under different absorption temperature. ($c_{\text{DBA}}=0.5 \text{ mol}\cdot\text{L}^{-1}$; $V_{\text{water}}:V_{\text{ethanol}}=5:5$; $Q_{\text{CO}_2}: 60 \text{ mL}\cdot\text{min}^{-1}$; V : 25 mL.)

The absorption loadings of the absorbents under different temperatures are shown in Figure S2. The results showed that the CO_2 absorption loading initially increased and then decreased as the absorption temperature continuously increased. The absorption loading of the mixtures reached a maximum ($0.82 \text{ mol}\cdot\text{mol}^{-1}$) when the temperature was 313 K, and reached a minimum ($0.53 \text{ mol}\cdot\text{mol}^{-1}$) at 333 K. Thus, the absorption temperature had a significant effect on the absorption loading of DBA/water/ethanol. In theory, the solubility of CO_2 decreased as the temperature increased, so the absorption loading of the solution at 303 K should be the largest value. However, the results showed that the DBA/water/ethanol solution did not reach the highest loading at 303 K but at 313 K. Besides solubility, viscosity also affected the absorption loading of the solution. The viscosity would decrease as the temperature increased, and the low viscosity was beneficial to the CO_2 absorption. Taking into account these two factors, the highest CO_2 loading of the solution was

found at 313 K. But further increased the temperature, both of the evaporation loss of the solution and the CO₂ desorption were increased which led to a decrease of the loading. Therefore, the absorption loading at 313 K was the highest.